

Name Key

Date _____

Area by Determinants

Find the area of the triangular regions described below.

1. A(0, 0), B(5, 8), and C(1, 12)

$$A = \frac{1}{2} \begin{vmatrix} 5 & 8 \\ 1 & 12 \end{vmatrix} = \frac{1}{2} 52 = 26 \text{ u}^2$$

2. D(1, -4), E(-4, 3), and F(8, 4)

$$A = \frac{1}{2} \left[\begin{vmatrix} 1 & -4 \\ -4 & 3 \end{vmatrix} + \begin{vmatrix} -4 & 3 \\ 8 & 4 \end{vmatrix} + \begin{vmatrix} 8 & 4 \\ 1 & -4 \end{vmatrix} \right] = \frac{1}{2} (-13 - 40 - 36) = 44.5 \text{ u}^2$$

3. G(-1, -3), H(-7, 4), and I(5, 0)

$$A = \frac{1}{2} \left[\begin{vmatrix} -1 & -3 \\ -7 & 4 \end{vmatrix} + \begin{vmatrix} -7 & 4 \\ 5 & 0 \end{vmatrix} + \begin{vmatrix} 5 & 0 \\ -1 & -3 \end{vmatrix} \right] = \frac{1}{2} (-25 - 20 - 15) = 30 \text{ u}^2$$

Find the area of the polygonal regions below.

4. M(3, -2), N(5, 7), P(-1, 15), and Q(-3, 6)

$$A = \frac{1}{2} \left[\begin{vmatrix} 3 & -2 \\ 5 & 7 \end{vmatrix} + \begin{vmatrix} 5 & 7 \\ -1 & 15 \end{vmatrix} + \begin{vmatrix} -1 & 15 \\ -3 & 6 \end{vmatrix} + \begin{vmatrix} -3 & 6 \\ 3 & -2 \end{vmatrix} \right] = \frac{1}{2} 140 = 70 \text{ u}^2$$

5. R(1, 2), S(5, 6), T(5, 9), and U(3, 12)

$$A = \frac{1}{2} \left[\begin{vmatrix} 1 & 2 \\ 5 & 6 \end{vmatrix} + \begin{vmatrix} 5 & 6 \\ 5 & 9 \end{vmatrix} + \begin{vmatrix} 5 & 9 \\ 3 & 12 \end{vmatrix} + \begin{vmatrix} 3 & 12 \\ 1 & 2 \end{vmatrix} \right] = \frac{1}{2} 38 = 19 \text{ u}^2$$

6. V(1, 8), W(4, 10), X(6, 3), Y(7, -3), and Z(2, -5)

$$A = \frac{1}{2} \left[\begin{vmatrix} 1 & 8 \\ 4 & 10 \end{vmatrix} + \begin{vmatrix} 4 & 10 \\ 6 & 3 \end{vmatrix} + \begin{vmatrix} 6 & 3 \\ 7 & -3 \end{vmatrix} + \begin{vmatrix} 7 & -3 \\ 2 & -5 \end{vmatrix} + \begin{vmatrix} 2 & -5 \\ 1 & 8 \end{vmatrix} \right] = \frac{1}{2} (-22 - 48 - 39 - 29 + 21) = 58.5 \text{ u}^2$$